L 27735-66

ACC NR: AT6015143   0

·by the modulating material. The linear electro-optical (Pockels) effect shows the
greatest promise. The materials presently available for SHF modulation based on the
effects studied in this paper do not meet the necessary requirements. The search for
new materials should be continued. Wideband light modulation requires protracted in-
teraction between the modulated and modulating signals and absence of dispersion in
the transmission line for the modulating signal. This requires a modulating cell for
excitation of a TEM wave. A transition to this type of wave requires the use of
crystals with small transverse dimensions making extremely rigid demands for treat-
ment and homogeneity. Orig. art. has: 2 figures, 43 formulas.   [14]

SUB CODE: 20/   SUBM DATE: 12Feb66/   ORIG REF: 021/   OTH REF: 027/
ATD PRESS: 5002

Card 2/2   BLG

L 30079-66   ~~(a)/~~(1)/~~(k)-2/~~(k) FBD/T   ~JP(c)   ~/JD

ACC NR: AT6022268   SOURCE CODE: UR/0000/66/000/000/0024/0027

AUTHOR: Deryugin, I. A.; Solomko, A. A.

ORG: none

TITLE: Information capacity of laser modulators in the microwave band

SOURCE: Vsesoyuznaya nauchnaya sessiya, posvyashchennaya Dnyu radio. 22d, 1966.
Sektsiya kvantovoy elektroniki. Doklady. Moscow, 1966, 24-27

TOPIC TAGS: solid state laser, laser modulation, laser communication

ABSTRACT: A formula is developed for the bandwidth of laser modulators based on the
linear electro-optical effect. The formula shows that the bandwidth increases
when the crystal length decreases. Microwave bandwidths are calculated for the
modulators having the form of a circular (mode E) and rectangular (mode TE)
waveguides partially loaded with active crystals. Neglecting the microwave losses,
a circular waveguide can transmit up to 10^7 bits per sec at 9470 Mc with $\Delta v = 30$ Mc,
a rectangular waveguide would transmit up to 10^9 bits per sec. With an allowance
for the microwave losses, the information capacity is still $10^5 - 10^7$ bits per sec.
Orig. art. has: 13 formulas.   [03]

SUB CODE: 20 / SUBM DATE: 11Apr66/ ATD PRESS: 5057

Card 1/1

L 09986-67   ET(d)/FSS-2   GD

ACC NR: AT6022270   SOURCE CODE: UR/0000/66/000/000/0031/0032

AUTHOR: Deryugin, I. A.; Kurashov, V. N.

ORG: none

TITLE: Certain properties of a threshold system for communications in the optical region

SOURCE: Vsesoyuznaya nauchnaya sessiya, posvyashchennaya Dnyu radio. 22d, 1966. Sektsiya kvantovoy elektroniki. Doklady. Moscow, 1966, 31-32

TOPIC TAGS: optic communication, photoelectric detection, photon, signal noise ratio

ABSTRACT: A binary optical communication system with a threshold receiver is analyzed. An expression for the optimum detection threshold level is derived from Mendel's formula for photoelectric detection:

$$\sum_{i=0}^{\infty} e^{-\alpha i} i^{N_{opt}} [P_{s+n}(i) - P_n(i)] = 0$$

where P_s, P_n are the probabilities of signal and noise photons detection; α is the photodetector efficiency. The optimum threshold value is valid for Poisson distribution

Card 1/2

L 09966-67
ACC NR: AT6022270

of photons. For a distribution other than Poisson's, the optimum threshold value chang-
es. The selection of an optimum receiver threshold substantially reduces the probabi-
lity of error, even for lower transmitter power. The application of quantum amplifi-
cation in threshold communication system was also investigated. Orig. art. has: 4
formulas.

SUB CODE: 20,09,17   /   SUBM DATE: 11Apr66

L 43648-66   EWT(1)/EWT(m)/EWP(j)/T/EWP(k)   GD/RM

ACC NR: AT6022273   SOURCE CODE: UR/0000/66/000/000/0041/0048

AUTHOR: Deryugin, I. A.; Oboznenko, Yu. L.

ORG: none

TITLE: Sweeping a light beam by ultrasonic waves

SOURCE: Vsesoyuznaya nauchnaya sessiya, posvyashchennaya Dnyu radio. 22d, 1966. Sektsiya kvantovoy elektroniki. Doklady. Moscow, 1966, 41-48

TOPIC TAGS: ultrasonic wave, gas laser, ultrasonic frequency, STANDING WAVE

ABSTRACT: If an ultrasonic standing wave is set up in a transparent medium at right angles to a narrow light beam, the wave will produce regions of greater and lesser density in the medium at half-wave intervals and thereby regions of greater and lesser refraction for the beam. These regions alternate places every half period. Therefore, the beam which is much narrower than the ultrasonic wavelength will be swept from side to side at the ultrasonic frequency. This phenomenon is analyzed on the basis of geometric optics. It is pointed out that large refraction angles require transducers that produce deep ultrasonic fields and fluids with large acoustical impedances. The effectiveness of a beam sweeping device increases with frequency up to a certain limit. With standing waves it is important that whole number of half waves fit between the ultrasonic transducer and the reflector. A model scanner using a helium-

Card 1/2

L 43648-66

ACC NR: AT6022273

2

-neon laser light source was constructed and tested. The light was passed through a beam former and through the test cell. A 200 w ultrasonic generator, set at right angles to the beam, drove a barium titanate transducer mounted in the cell. The resonance frequency was 250 kc. Without ultrasonic excitation, a small spot appeared on the screen. When the ultrasonic excitation was switched on, a line appeared, and the deflection angle was calculated by triangulation. Deflection was 1.5 deg for water, 1.6 deg for xylene, and 2.0 deg for tetrachloroethylene. Orig. art. has: 4 figures.

SUB CODE: 20/   **SUBM DATE:** 11Apr66

LS

Card 2/2

L 45   (1)

ACC NR: AT6015144   SOURCE CODE: UR/0000/66/000/000/0259/0291

AUTHOR: Deryugin, I. A.

ORG: Kiev State University (Kiyevskiy gosudarstvennyy universitet)

TITLE: Noise in quantum devices

SOURCE: Respublikanskiy seminar po kvantovoy elektronike. Kvantovaya elektronika (Quantum electronics); trudy seminara. Kiev, Naukova dumka, 1966, 259-291

TOPIC TAGS: quantum amplifier, quantum device, noise, ELECTRONIC AMPLIFIER, RADIO NOISE

ABSTRACT: Lower by three orders than the noise in conventional amplifiers, the quantum-amplifier noise is due to two factors: Thermal fluctuation and spontaneous emission of active microparticles. The first noise source can be subdivided into the thermal fluctuation of passive substance (resonator walls, etc.) and the thermal fluctuation of the amplifying substance transferred to a negative-temperature state. The latter component and the spontaneous-emission noise are investigated in this article which is a compilation based on 3 Soviet and 23 Western published sources. The nature of noise in quantum systems transferred to a negative-temperature state.

Card 1/3

ACC NR: AT6015144

By using the V. S. Troitskiy et al. approach (IVUZ. Radiofizika, 1961, 4, 3, 508), it is proven that the H. B. Callen and T. A. Welton theorem (Phys. Rev., 1951, 83, 1, 34) is applicable to a 2-level molecular system. The thermal noise in an inverted system is maximal at $T_m \to -\infty$, i.e., with equal populations in both levels. With $T_m \to -0$, the thermal noise approaches its minimum; this means that in $N^{14}H_3$ - maser-type amplifiers, the thermal noise is in principle lower than in 3-level amplifiers. Noise factor of a generalized amplifier. This noise factor is defined as a ratio of noise power at the output of a real amplifier to that at the output of the perfect amplifier. A general and a few specific formulas for the noise factor are derived; they help to determine the output noise power at any temperature of the source of input noise. Noise in a TW quantum amplifier. An equation is set up which describes noise-power variation along the waveguide (filled with a negative-temperature medium). It is found that the noise factor increases as the non-equilibrium-medium gain decreases and as the waveguide-wall loss increases. As the pumping-caused noise is usually very small, the noise factor of a 3-level TW amplifier practically does not differ from that of a 2-level amplifier. Noise factor of a circulator-type quantum amplifier. The noise in this amplifier is due only to the active substance and, hence, can be very low; with a low-loss circulator, its cooling becomes unnecessary which is an advantage of this type amplifier. Noise factor of a

Card 2/3

ACC NR: AT6015144   ◯

circulatorless quantum amplifier. The corresponding formulas take into account the second coupling aperture and ferrite valves. The noise factor of this amplifier is always higher than that of a circulator-type amplifier. Noise in molecular amplifiers and generators. Unlike paramagnetic amplifiers, the molecular amplifiers have an additional noise source connected with the fluctuation of the number of active particles in the beam. Contribution of this noise in the total amplifier noise is evaluated; ordinarily, it is small as compared to the thermal noise; however, at low temperatures or at high frequencies it may become substantial. Measuring noise temperature of quantum amplifiers. A typical arrangement is described (R. W. De Grasse et al., J. Appl. Phys., 1960, 31, 3, 443; J. P. Gordon et al., Proc. IRE, 1958, 46, 3, 1588). Orig. art. has: 6 figures and 178 formulas.

SUB CODE: 20, 09 / SUBM DATE: 12Feb66 / ORIG REF: 005 / OTH REF: 021

L 45860-66   EWT(d)/FSS-2/EWT(1)   IJP(c)   GG/GD

ACC NR: AT6015145   SOURCE CODE: UR/0000/66/000/000/0292/0319

AUTHOR: Deryugin, I. A.; Kurashov, V. N.   9/

ORG: Kiev State University (Kiyevskiy gosudarstvennyy universitet)   B+/

TITLE: Quantum effects in information-transmission systems

TOPIC TAGS: quantum theory, information theory, ELECTROMAGNETIC RADIATION, ENTROPY, SIGNAL TO NOISE RATIO, COMMUNICATION CHANNEL, WIDEBAND COMMUNICATION

ABSTRACT: Based on well-known Western sources (T. Stern, IRE Trans., JT-6, 1960, 4, 435; J. Gordon, "Advances in Quantum Electronics," 1961, 4, 509; J. Gordon, Proc. IRE, 1962, 50, 9, 1929), a quantum-channel model is described which allows for not only the zero-field noise but also for the effects associated with discrete electromagnetic radiation; applied to various communication systems, this model reveals new and interesting relations which have not been described by the classical theory of information. The following authors' results re wideband communication channels are added: The signal entropy in a wideband quantum channel reaches

Card 1/2

L 45860-66

ACC NR: AT6015145

its maximum when the signal field coincides with the black-body radiation field: $\overline{N}(\nu) = \left[\exp\left(\frac{h\nu}{kT}\right) - 1\right]^{-1}$. If an additive thermal noise is present in the channel, the information capacity reaches its maximum when the above condition is referred to the signal-noise sum. The entropy capacity is always finite being limited by:

$H_{\text{макс}} = \pi\left[\frac{2P}{3h}\right]^{\frac{1}{2}}$. Orig. art. has: 12 figures and 38 formulas.

SUB CODE: 17, 20 / SUBM DATE: 12Feb66 / ORIG REF: 001 / OTH REF: 016

Card 2/2 ULR

L 08753-67   EWT(1)

ACC NR: AP6029120   SOURCE CODE: UR/0048/66/030/006/1008/1008

AUTHOR: Deryugin, I. A.; Melkov, G. A.

ORG: none

TITLE: On the frequency of parametrically excited spin waves /Report, All-Union Conference on the Physics of Ferro- and Antiferromagnetism held 2-7 July 1965 in Sverdlovsk/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 6, 1966, 1008

TOPIC TAGS: spin wave, ferrite, frequency doubling, parametric resonance

ABSTRACT: The authors have investigated the relation between the pumping power P at frequency f_k, the wave vector k, and the polar angle θ_k of parametrically excited spin waves under conditions of saturation of the fundamental resonance. The wave vector was eliminated with the aid of the dispersion equation of H.Suhl (J. Phys. Chem. Soc., 1, No. 4, 209 (1957)), and the polar angle was calculated from plots of the second harmonic power as a function of the pumping power. Second harmonic production by spin waves can exceed the usual frequency doubling effect in ferrites by a factor of 2 or 3. Experimental data on a 3 mm diameter yttrium iron garnet sphere at a second harmonic frequency of 9.37 kMHz are presented. No frequencies other than 2f were observed, from which it is concluded that the equation $f_k = f$ is strictly satisfied. The

Card 1/2

L 08753-67

ACC NR: AP6029120

polar angle did not drop immediately to zero when the second order instability threshold of Suhl was exceeded, but decreased gradually with increasing pumping power. When θ_k reached 43° (at a pumping power about 7 db above the threshold) the oscilloscope display became unstable and further measurements were impossible, but it is presumed that θ_k fell rapidly to zero with further increase of the pumping power. The present data are in agreement with (but provide more information than) those of C.W. Haas, T.J.Matcovich, H.S.Belson, and N.Goldberg (Phys. Rev., 132, No. 5, 1980 (1963)), which were obtained by a resonance shift method. Orig. art. has: 1 formula and 1 figure.

SUB CODE: 20/   SUBM DATE: 00/   ORIG REF: 000/   OTH REF: 003

L. 38755-67   EWT(l)/EWT(m)/EWP(t)/ETI   IJP(c)   JD/JG/GG
ACC NR: AP6029122   SOURCE CODE: UR/0048/66/030/006/1011/1011

AUTHOR: Deryugin, I. A.; Danilov, V. V.

ORG: none

TITLE: Effect of crystal defect on the width of the ferromagnetic resonance line in
ferrites /Report, All-Union Conference on the Physics of Ferro- and Antiferromagnet-
ism held 2-7 July 1965 in Sverdlovsk/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 6, 1966, 1011

TOPIC TAGS: ferromagnetic resonance, line widths, single crystal, yttrium compound,
ferrite, garnet, anisotropy, crystal lattice defect

ABSTRACT: Spherical single crystal specimens of yttrium iron garnet were annealed
and then quenched from 750° C in water. This treatment had no effect on the width
of the ferromagnetic resonance (FMR). From this it is concluded that point defects
(vacancies and interstitial atoms) do not contribute significantly to the width of
the FMR line. Samples of the same material were annealed at 700° and ground with
40 to 60 micron abrasive grains. This treatment increased the width of the FMR line.
This is ascribed to increase in the depth of the distorted surface layer. Polishing
the ground samples and annealing then reduced the width of the FMR line by 10-15 %.
This is ascribed to reduction of the density of dislocations in the deformed surface

Card 1/2

L 08755-67

ACC NR: AP6029122

layer. Although reduction of the dislocation density reduced the width of the FMR line, it did not alter the form of the dependence of the line width on the sample orientation, i.e., the anisotropy of the FMR line width. Experimental curves (not shown) giving the width of the FMR line as a function of the orientation angle of polished single crystal yttrium iron garnet samples were similar in shape to the curves giving the derivative of the resonance field with respect to the orientation angle of the corresponding samples. From this it is concluded that the anisotropy of the FMR line width in these samples is due to separation of the surface layer into differently oriented blocks by a network of dislocations.

SUB CODE: 20/   SUBM DATE: 00/   ORIG REF: 002/   OTH REF: 001

Card 2/2   bc

AUTHOR: Deryugin, I. A.; Vorontsov, V. I.

ORG: Kiev State University (Kiyevskiy gosudarstvennyy universitet)

TITLE: Quadratic relationships in electrodynamics of moving media

SOURCE: IVUZ. Radiofizika, v. 9, no. 6, 1966, 1155-1163

TOPIC TAGS: electrodynamics, moving medium, perturbatiol method, quadratic relationship, resonator, waveguide

ABSTRACT: A generalization is given of well known quadratic relationships of macroscopic electrodynamics (generalized Umov-Poynting's theorem, Lorentz lemma and lemmas for the complex conjugate values) for the electrodynamics of moving generalized gyrotropic media. Reciprocity principle is correlated with the fundamental operations of space-time inversion, charge and complex conjugations and their combinations. The classification is given for the reciprocity types of moving material media in accordance with the types of symmetry. It was shown that the application of quadratic relationships in electrodynamics of moving media

ACC NR: AP7001217

lead to a derivation of basic formulas for the calculation of changes of waveguides and resonators based on the perturbation method. Orig. art. has: 35 formulas.
[Authors' abstract]   [AM]

SUB CODE: 09, 20/SUBM DATE: 29May65/ORIG REF: 011/OTH REF: 001/

~~, 2/2.

ACC NR: AP7004897   SOURCE CODE: UR/0109/66/011/012/2147/2152

AUTHOR: Deryugin, I. A.; Kurashov, V. N.

ORG: Kiev State University im. T. G. Shevchenko (Kiyevskiy gosudarshvennyy universitet)

TITLE: Some distinctive features of a frequency-division multiplexing system in the optical band

SOURCE: Radiotekhnika i elektronika, v. 11, no. 12, 1966, 2147-2152

TOPIC TAGS: laser communication, optic   communication, frequency division multiplex

ABSTRACT: Information capacity and losses in the optical communication band during frequency-division multiplexing are considered. The maximum and optimum channel number is determined by means of an equation for calculating information capacity of an optical communication system. The equation was derived using general information theory. It is shown that the number of channels for maximum capacity of an optical communication system is 5×10^2 at a signal-to-noise ratio (λ) of 10^6, and 3×10^3 channels at $\lambda = 10^9$. Because all channels do not operate with equal efficiency, however, the optimum channel number is only 20% of

Card 1/2   UDC: 621.396.2

ACC NR: AP7004897

the maximum number. For cosmic communication (where $\lambda = 10^4 - 10^6$),
10—100 channels can be used for optimum operation. Consideration of
information losses during the division of laser energy among the
channels shows that, because of the quantum nature of radiation, these
losses may be very high: in the above-mentioned instance (100 channels,
$\lambda = 10^6$) 2/3 of the information will be lost. Orig. art. has: 24 formulas.
[WP]

SUB CODE: 09,17/ SUBM DATE: 31May65/ ORIG REF: 001/ OTH REF: 006
ATD PRESS: 5116

Card 2/2

ACC NR: AP7005129

AUTHOR: Deryugin, I. A.; Sigal, M. A.

ORG: Kiev State University im. T. G. Shevchenko (Kiyevskiy gosuniversitet)

TITLE: Magnetization of fine-disperse particles of Fe-Co alloy

TOPIC TAGS: metal powder, iron base alloy, cobalt, magnetization, magnetic anisotropy

ABSTRACT: The magnetic properties of elongated single-domain particles of Fe and Fe-Co are of interest to the applicability of these particles as the material of permanent magnets. In this connection the hysteresis loop, initial susceptibility and magnetization of elongated single-domain particles, as calculated on the basis of the Stoner-Wohlfarth model of coherent magnetization reversal (Stoner, E. C., Wohlfarth, E. P. Phil. Trans. Ro. Soc., 1948, 240, 599), are compared with experimental findings. An allowance is made for the distribution function with respect to anisotropy, determined by measurements of natural ferromagnetic resonance in single-domain powder of Fe-Co within the range of 400-40,000 mega-cps, since the Stoner-Wohlfarth model pertains to particles of a regular ellipsoid shape whereas the

UDC: 538.24

Card   1/2

ACC NR: AP7005129

powders in question consist of elongated particles with short lateral protrusions. It is shown that despite the irregularity of the structure and shape of the Fe-Co particles considered, and the concomitant decrease in anisotropy the experimental and theoretical findings on the shape of the hysteresis loop, initial susceptibility and magnetization essentially are in satisfactory agreement. This is also demonstrated by a comparison of the experimental and theoretical curves of the initial magnetization and hysteresis loop of Fe-Co powders consisting of a mixture of single- and multiple-domain particles. Orig. art. has: 6 figures, 17 formulas, 1 table.

SUB CODE: 20/ SUBM DATE: 07Oct65/ ORIG REF: 006/ OTH REF: 014

2/2

DERYUGIN, I.P.

MD

The eradication of the dodder (Cuscuta) from the crops of perennial grasses with the aid of ammonium dinitrophenolate. F. K. Vorob'ev, M. Yu. Berezovskii, and I. P. Deryugin. *Referaty Dokladov Timiryazev. Sel'skokhoz. Akad.* 1954, No. 18, 129-35; *Referal. Zhur., Biol.* 1955, No. 8921.—Comparative tests were performed with NH₄ dinitrophenolate (I), NH₄ dinitro-o-cresolate (II), and Na arsenite (III) as dodder eradkators from the crops of alfalfa and clover. I proved the weakest as an herbicide, but 25-30 times less toxic than III to man, animals, and crops. It is also more readily available to mass production. The addn. to a suspension of I of 1% (NH₄)₂SO₄ enhances its herbicidal properties. For practical purposes the optimums recommended were for alfalfa 3-4% and for clover 2-3% suspension applied at the rate of 800 l./ha. Spraying of the stubble killed 90-96% of the parasitic herb and increased the yield of hay 11.8-15.7 centners/ha.

DERYUGIN, I. P.

"Certain Derivatives of Phenol as Substances for the Control of Dodder." Cand Agr Sci, Moscow Order of Lenin Agricultural Academy imeni K. A. Timiryazev, Moscow, 1955. (KL, No 17, Apr 55)

SO: Sum. No. 704, 2 Nov 55 - Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (16).

DERYUGIN, I.S.

    Achievements of the seven-year plan. Metallurg 8 no.5:32
    My '63.   (MIRA 16:7)

       (Pipe mills—Technological innovations)

DERYUGIN, KONSTATIN KONSTANTINOVICH

DERYUGIN, Konstantin Konstantinovich; KARELIN, Dmitriy Borisovich [deceased]; GAKKEL', IA.IA., doktor geograficheskikh nauk, professor, redaktor; LEONOVA, B.I., redaktor; BRAYNINA, M.I., tekhnicheskiy redaktor

[Ice field observations] Ledovye nabliudeniia na moriakh. Pod red. IA.IA.Gakkelia. Leningrad, Gidrometeorologicheskoe izd-vo, 1954.
167 p.   (MLRA 8:4)
        (Ice)

DERYUGIN, K.K.

Results of using current integrators at stations operating on a
24-hour basis and a comparison of their readings with data of marine
current meters. Trudy GOIN no.30:131-137 '55.   (MLRA 9:8)
          (Ocean currents) (Flowmeters)

DERYUGIN, K.K.

Converting medium trawler for oceanographic research and results of setting up stations operating on a 24-hour basis on them. Trudy GOIN no.30:143-154 '55.   (MLRA 9:8)
           (Ships) (Oceanographic research)

DERYUGIN, K.K., red.; PROTOPOPOV, V.S., red.; BRAYNINA, M.I., tekhn. red.

[Study of sea ice abroad]Issledovaniia morskogo l'da za rubezhom. Leningrad, Gidrometeoizdat, 1962. 165 p.

(MIRA 15:9)

(Sea ice)

L 26695-65   EWT(l)   GW

ACCESSION NR: AR4047587   S/0169/54/000/009/V003/V003

AUTHOR: Deryugin, K. K.

TITLE: First voyages of the interuniversity scientific training oceanological expedition on the scientific training vessel "Bataysk"

SOURCE: Ref. zh. Geofizika, Abs. 9V15

CITED SOURCE: Sb. Materialy* 2 Konferentsii po probl. Vzaimodeystviye atmosf. i gidrosf. v sev. chasti Atlant. okeana. L., Leningr. un-t, 1964, 269-278

TOPIC TAGS: oceanography, oceanological expedition, training voyage

ABSTRACT: During the period August 1960-May 1961 the scientific vessel "Bataysk" made five voyages. The practical training work of the students and graduate students was centered on scientific research work in various regions of the seas of northern Europe and in the North Atlantic. A. Ye.

ENCL: 00   SUB CODE: ES

Card 1/1

DERYUGIN, Konstantin Konstantinovich

    [Man subjugates the ocean depths] Chelovek pokoriaiet glu-
biny okeana. Moskva, Nauka, 1965. 197 p. (MIRA 18:7)

DARUGIN, KONSTANTIN MIKHAILOVICH .

DARUGIN, KONSTANTIN MIKHAILOVICH
Issledovanie Barentsova i Belogo morei i Novoi Zemli. 1921-1924 gg. Arkh-
angel'sk, Izd. Arkhangel'skogo ob-va kraevedeniia, 1925;
44 p. (Biblioteka severovedeniia)
MN

SO: LC, Soviet Geography, Part I, 1951 Uncl.

DERYUGIN, K. M.

Hydrology of the White Sea, Zapiski po gidrografii, XLVII, 1939

DERYUGIN, K. M.

"Advance of Soviet Hydrobiology in the Study of the Sea", (p. 9) by Deryugin, K. M.

SO: Advance in Contemporary Biology (USPEKHI SOVREMENNOI BIOLOGII) Vol. V, No. 1   1936

DERYUGIN, K. M.

"On the physiology of differentiation and growth. II. The Pasteur-Meyerhof equilibrium in the development of fish." (p. 243) Laboratory of the Zoology of Vertebrates, (Chief: Deryugin, K. M.), Biological Institute, Leningrad State University. by Trufonova, A. N.

SO: Biological Journal (Biologicheskii Zhurnal) Vol. VI, 1937, No. 2

DERYUGIN, K. M.

Deryugin, K. M. - "The first steps in the organization of a marine biological station," Trudy Murman, biol. stantsii, Vol. I, 1948, p. 5-9

SO: U-5600, 10 July 50, (Letopis 'Zhurnal 'nykh Statey, No. 6, 1949).

DERYUGIN, K. M.

USSR/Geophysics - Internal Waves   Jul/Aug 53

"Internal Waves in the Southern Part of the Atlantic
Ocean," B. A. Shlyamin

Iz V-s Geog Ob, Vol 85, No 4, pp 470-474

States that internal waves in the sea have much
value for detg the position of the layer of dis-
continuity and for studying the daily migration of
plankton. Mentions temp and salinity obs made in
the Baltic Sea by K. M. Deryugin, "Internal Waves,"
News of the State Hydrological Inst, 1933 (O
vyntrenniki volnakh, Izd. GGI, 1933).

271T75

DERYUGIN, L. N.

PA 30 49 T101

USSR/Radio   Nov/Dec 48
    Wave Guides
    Frequency Measurements

"Calculation of the Critical Frequency of Π- and H-Wave Guides," L. N. Deryugin, $12\frac{1}{2}$ pp

"Radiotekh" Vol III, No 6

Derives general formulas linking critical frequency of H_{10} wave with cross-sectional dimensions of Π- and H-wave guides, on which basis design graphs for such wave guides are constructed. In deducing general formulas, no restrictions are made as to possible dimensions of wave guides of shape under consideration. Examines some limiting cases. Submitted 10 Jun 48.
                                    30/49T101

DERYUGIN, L. N.

Cand Tech Sci

Dissertation: "Investigation of the Critical Frequency of Wave Guides."
19 Mar 49

Moscow Order of Lenin Aviation Inst
imeni Sergo Ordzhonikidze

**SO Vecheryaya Moskva
Sum 71**

DMITRIEV, L. M.

Electromagnetism

Reduction of boundary problem of vortex currents
in a disc to quadratures. Dokl. AN SSSR 82, No. 5, 1952.

Bayrev, I. M.

Electromagnetism

Distribution of currents in a disc, rotating in a
homogeneous magnetic flux, and breaking action.
Dokl. AT SSSR 82, No. 4, 1952

DERYUGIN, L. N.

PA 240T93

USSR/Physics - Wave Reflection   21 Dec 52

"Equations for Coefficients of Reflection of
Waves From a Periodically Uneven Surface," L. N.
Deryugin

"DAN SSSR" Vol 87, No 6, pp 913-916

Presents system of linear algebraic eqs for com-
putation of coeffs of reflection of a two-di-
mensional electromagnetic wave incident along the
normal to an ideally conducting unlimited surface
with one-dimensional periodical uneveness in
shape of rectangular teeth. Presented by Acad
M. A. Leontovich. Received 20 Oct 52.

240T93

Deryugin, L. N.

Deryugin, L. N. On the theory of diffraction from a 62. reflecting grid. Doklady Akad. Nauk SSSR (N.S.) 93, 1003-1006 (1953). (Russian)

The author develops further his analysis of the problem of a plane wave incident on a perfectly conducting plane with parallel rectangular grooves [same Doklady (N.S.) 87, 913-916 (1952); these Rev. 15, 183], assuming now that the width of a groove is small compared to the incident wave-length. After various approximations he finds the field components at the opening to a groove in terms of two functions, for which graphs are given. Special cases of the groove-depth are discussed. It appears that the analysis does not apply when the incident wave-length approximates to a submultiple of the period of the grid. _F. V. Atkinson._

DERYUGIN; L.N.

B. T. R.
June 1954
Physics

Ⓤ

8779* Surface Resonance on a Reflection Grating. (Russian.) L. N. Deriugin. *Doklady Akademii Nauk SSSR*, v. 94, no. 2, Jan. 11, 1954, p. 203-206.
Investigation during diffraction of a normally incident plane wave on a reflection grating with narrow grooves. Compares such diffraction with diffraction far from resonance. Graph. 2 ref.

Name: DERYUGIN, Lev Nikolayevich

Dissertation: Investigation of the electrodynamic properties of finned surfaces

Degree: Doc Tech Sci

Affiliation: /Not indicated/

Defense Date, Place: 16 Apr 56, Council of Moscow Order of Lenin Aviation Inst imeni Ordzhonikidze

Certification Date: 16 Mar 57

Source: BMVO 13/57

DERYUGIN, L.N.; FRIDMAN, G.Kh.

Resonance curves of the double resonance on diffraction gratings.
Dokl. AN SSSR no.6:1209-1211 D '56.   (MLRA 10:3)

1. Predstavleno akademikom M.A. Leontovichem.
            (Diffraction)

SOV/142-58-4-14/30

AUTHOR: Voskresenskiy, D.I., Granovskaya, R.A., Deryugin, L.N.,
             Naumenko, Ye.D., Trunova, N.V.

TITLE: A Delay System of Periodic Structure with Non-Contact
             Plates (Zamedlyayushchaya sistema periodicheskoy
             struktury s beskontaktnymi plastinami)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - Radiotekhnika,
             1958, Nr 4, pp 480-489 (USSR)

ABSTRACT: The paper discusses a delay system consisting of two
             rows of symmetrically placed plates which have no
             contact with the walls arranged in the form of a right-
             angled waveguide. This system is intended for a
             travelling-wave tube with additional acceleration of
             the electrons by permanent fields in interaction space.
             The effects of the system's dimensions on its electro-
             dynamic characteristics are analyzed and a method of
             "cold" measurement of their dispersion curves described.
             Experimental dispersion curves for some models of the
Card 1/3   system are adduced. As theoretical analysis of the

A Delay System of Periodic Structure with Non-Contact Plates

electrodynamic parameters is complicated by
their   geometrical complexity, special attention is
paid to the experimental investigation of this system.
For all the models studied a change in retardation
from 4 to 7 corresponds to a relative frequency band
of 10% - 15% and a displacement of the nodal plane of
roughly 10% from the total height of the plate h. The
coupling impedance at the axis in this deceleration
interval is 10 - 30 ohm. Maximum coupling impedance
is relatively small and does not go below 10 ohm.
Maximum possible retardation (γ max) in the system
is determined by the general formula:

$$\gamma\, max \; = \; \frac{1}{2}\; \frac{\lambda}{T}$$

The resonance method was used to measure the retard-
ation. The measuring method is accurately described
as well as the results of experimental investigation.
The frequency band, corresponding to the variation in
retardation from 4 to 7 has the same order of magni-
Card 2/3   tude as in corresponding three channel systems.

A Delay System of Periodic Structure with Non-Contact Plates   SOV/142-58-4-14/30

There are 7 graphs, 1 block diagram, 1 schematic diagram, 1 table, 1 photograph and 3 Soviet references.

ASSOCIATION: Kafedra radioperedayushchikh ustroystv Moskovskogo ordena Lenina aviatsionnogo instituta imeni Sergo Ordzhonikidze   (Chair   of Radio Transmitting Equipment, Moscow, Order of Lenin Aviation Institute imeni Sergo Ordzhonikidze)

SUBMITTED: March 17, 1958

Card 3/3

SOV/142-58-5-7/23

9(3)
AUTHORS: Voskresenskiy, D.I., Granovskaya, R.A., Deryugin, L.N., Naumenko, Ye.D., and Trunova, N.V.

TITLE: Measuring of Coupling Resistances of a Retardation System with Non-Contacting Plates

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, radiotekhnika, 1958, Nr 5, pp 565-572 (USSR)

ABSTRACT: The authors describe methods to determine coupling resistances of a periodic retardation system with non-contacting plates. For measuring, the method of "absorbing switching-in" is used, which measures the change of durability of the resonance dummy with a retarding system. It starts with bringing a small absorbing element into the resonator (Fig.1). By experiments, it was found, that the presence of four metal tie plates, arranged symetrically within the knots of an electric field (Fig.5 and 6), did not change the characteristics of the system. Neither did displacing the tie plates from the knots over a distance of $\pm$ 15 mm lead to a considerable change of characteristics. The article is recommended by

Card 1/2

SOV/142-58-5-7/23

Measuring of Coupling Resistances of a Retardation System with Non-Contacting Plates

the Kafedra radioperedayushchikh ustroystv Moskovskogo ordena Lenina aviatsionnogo instituta imeni Sergo Ordzhonikidze (Chair of Radio Transmission Devices at Moscow Institute for Aviation imeni Sergo Ordzhonikidze of the Order of Lenin). There are 3 figures, 3 graphs, 10 equations and 4 references, 1 of which is Soviet, 2 English and 1 German.

SUBMITTED: March 17, 1958

Card 2/2

30740

9.4230

9.3700

S/535/60/000/125/001/008
E033/E162

AUTHORS: Voskresenskiy, D.I., Granovskaya, R.A., and
Deryugin, L.N.

TITLE: A method of measurement of the electrical
characteristics of slow-wave systems having weak
space-harmonics

SOURCE: Moscow. Aviatsionnyy institut. Trudy. no.125, 1960.
Elektromagnitnyye zamedlyayushchiye sistemy; metodika
izmereniya elektricheskikh kharakteristik.   5-13.

TEXT: The article examines a method of measuring the
electrical characteristics - the coupling impedance and the
retardation factor - of slow-wave structures when the space
harmonics are negligible in comparison with the fundamental.
This case is termed the "monoharmonic" case and means, physically,
that the periodic structures may be replaced by an equivalent
retarding continuous medium. The electromagnetic field components
in a monoharmonic travelling wave, propagating along the z-axis of
the system, can be written:

Card 1/7

A method of measurement of the ....

30740
S/535/60/000/125/001/008
E033/E162

$$\dot{A}_m(x,y) \ e^{jk_z z}$$

where $\dot{A}_m(x,y)$ is the complex amplitude of the corresponding
component, depending on the coordinates in the cross-sectional
plane of the system, and k_z is the phase constant, which is
related to the phase velocity and the wavelength along the system
by:

$$v_z = \frac{\omega}{k_z} , \qquad \lambda_z = \frac{2\pi}{k_z}$$

By "retardation factor" is meant the ratio of the wave velocity c
in free space to the phase velocity v_z in the system.

$$\Upsilon = \frac{c}{v_z} = \frac{\lambda}{\lambda_z} = \frac{k_z}{k} \qquad\qquad (1)$$

where λ and k are the free space wavelength and phase constant
respectively for the corresponding working frequency.
Experimental determination of the retardation factor by phase

Card 2/9

30740

A method of measurement of the ...   S/535/60/000/125/001/008
                                        E033/E162

measurements on travelling or standing waves is ruled out by a
number of practical difficulties, and therefore a resonance method
is used. This consists of obtaining dispersion curves by "cold"
measurements on models formed by short-circuiting both ends of
resonant sections of slow-wave systems. The coupling impedance is
determined in the same models by the absorption method.   To
simplify the experimental investigation, the models are scaled up
and lower frequencies used. The section is short-circuited at
both ends by plane metallic walls, thus forming a cavity resonator
in which resonant fields, having the structure of the retarded
waves in cross-section, are excited by suitable coupling elements.
Resonance will occur when the length between the end walls   L   is
given by

$$L = m\lambda_z/2$$

where   m   is an integer. After the model has been tuned to the
particular wave, the dimension   L   is changed by moving one end
wall, and the experimental dependence of the slow-wave length on
the resonant frequency $\lambda_z(f_p)$ is obtained. From this, the
dispersion retardation characteristic:

Card 3/ 7

30740

A method of measurement of the ...   S/535/60/000/125/001/008
                                        E133/E162

$$\gamma(f_p) = \frac{\lambda(f_p)}{\lambda_z(f_p)} \quad \frac{c}{f_p \lambda(f_p)} \tag{2}$$

may be obtained. To avoid practical difficulties, a fixed length
L may be used and, by changing the excitation frequency, a
discrete number of experimental points on the dispersion
characteristic, which correspond to resonant values $\lambda_z = (2/m)$ L,
may be obtained. The block diagram of the set-up is shown in
Fig.1. The coupling impedance at a point in the cross-section of
a monoharmonic slow-wave structure is:

$$R = \frac{E_z^2}{2k_z^2 P} \tag{3}$$

where E_z is the amplitude of the longitudinal component of the
electric field at the point, and P is the power flow of the
wave under consideration. Direct measurement of these quantities
is difficult. A suitable method of experimental determination of
the coupling impedance is by measuring the change in the Q-factor

Card 4/ 9

30740

A method of measurement of the S/535/60/000/125/001/008
E133/E162

(or in the bandwidth) of the resonant model when a small absorbing body is introduced into it. The coupling impedance is found from:

$$R = \frac{L}{8\pi^2} \left| \frac{d\lambda_z}{df} \right| \frac{E_z^2}{W} \tag{5}$$

where W is the total electromagnetic energy in the section; $d\lambda_z/df$ is found from the dispersion characteristic $\lambda_z = \lambda_z(f)$; and E_z^2 can be measured on the model by:

$$\frac{E^2}{W} = \frac{2\pi}{\mu} (\Delta f' - \Delta f) \tag{10}$$

where Δf is the half-power bandwidth with no absorption and $\Delta f'$ is the bandwidth with the absorption body in the model; μ is the absorption coefficient of the body, which can be calculated from its dimensions, orientation, permittivity and permeability, or can be measured experimentally. Measurement accuracies of the order of 10% for the coupling impedance and several percent for the retardation factor are obtainable.

Card 5/7

30740

A method of measurement of the ...   S/535/60/000/125/001/008
E133/E162

The practical advantages of the methods described over other methods are discussed.
There are 1 figure and 3 non-Soviet-bloc references. The English language references read as follows:
Ref.1: R.L. Sproull, E.G. Linder. Resonant Cavity Measurements, PJRE, 1946, Vol.34, No.5, pp.305-312.
Ref.3: E.J. Nalos. Measurement of Circuit Impedance of Periodically Loaded Structures by Frequency Perturbation. PJRE, 1954, Vol.42, No.10, p.1508.

Card 6/7

9,4230

9,3700

30741

S/535/60/000/125/002/008
E133/E162

AUTHOR ·   Deryugin, L. N.

TITLE :   A method of measurement of the electrical
characteristics of slow-wave systems having pronounced
space harmonics

SOURCE: Moscow. Aviatsionnyy institut. Trudy. no.125, 1960.
Elektromagnitnyye zamedlyayushchiye sistemy; metodika
izmereniya elektricheskikh kharakteristik. 14-34.

TEXT: The article examines methods of measuring the
electrical characteristics - the coupling impedance and the
retardation factor - of slow-wave structures under "polyharmonic"
conditions, i.e. when the space harmonics are not negligible in
comparison with the fundamental. The problem is treated under four
headings: 1) Measurements under travelling wave conditions;
2) Features of standing waves in slow-wave structures when
harmonics are present;   4) Measurement of the coupling impedance
by the absorption method;   3) Measurement of the delay by the
resonance method.

Card 1/10

30781

A method of measurement of the ...   S/535/60/000/125/002/008
E133/E162

The longitudinal electromagnetic field components $\dot{E}_z$ in a polyharmonic system can be written:

$$\dot{E}_z = \dot{A}(x,y,z)\, e^{jk_z z} \qquad (1)$$

where: $\dot{A}(x,y,z)$ is the complex amplitude and has a period T equal to the period of the slow wave structure; k_z is the phase constant of the retarded wave. Expansion by the Fourier series gives:

$$\dot{E}_z = \sum_{n=-\infty}^{+\infty} \dot{A}_n(x,y)\, e^{jk_{nz} z} \qquad (4)$$

where $\dot{E}_z$ is expressed as an infinite series of space harmonics. The values:

$$k_{nz} = k_z + n\,\frac{2\pi}{T} \qquad (5)$$

are the phase constants of the harmonics and the functions $\dot{A}_n(x,y)$ are their complex amplitudes at different points in the cross-section of the slow-wave structure. Since in polyharmonic
Card 2/10

30741

A method of measurement of the ...   S/535/60/000/125/002/008
E133/E162

systems mutual interaction between the electron beam and any
harmonic may occur, it is usually necessary to determine the
coupling impedance of several harmonics. The coupling impedance of
the nth harmonic is given by:

$$R_n = \frac{A_n^2}{2k_{nz}^2 P} \tag{6}$$

where P is the power flow of the slow wave (including all the
harmonics).   After enumerating the practical difficulties in
establishing a travelling wave regime and of measuring the phase
distribution by probes, attention is turned to the features of
standing waves in polyharmonic slow-wave structures, and to
experimental investigation by the resonance method. The resonant
model simulates an infinitely long slow-wave structure and is
formed by reflection at end walls located in planes of mirror
symmetry of the structure. The polyharmonic system is investigated
theoretically to find whether cross-sectional nodal planes exist
at which the short-circuiting walls may be placed. It is shown

Card 3/ 10

30741

A method of measurement of the ...   S/535/60/000/125/002/008
E133/E162

that a standing wave in a polyharmonic system consists of an
infinite series of space harmonics, each of which forms a
monoharmonic standing wave. These harmonics have different space
periods and, in general, the nodes of any one harmonic do not
coincide with the nodes of the others, so that the polyharmonic
standing wave is not periodic and does not have cross-sectional
nodal planes. If, however, a plane metallic end wall is placed
in the waveguide in the plane of symmetry (z = 0), then, in
accordance with the boundary condition $\dot{E}_{tang.} = 0$, a reflected
wave will arise in the waveguide with field components:

$$\dot{E}'_x(x,y,z) = - \dot{E}_x(x,y, -z),$$
$$\dot{E}'_y(x,y,z) = - \dot{E}_y(x,y, -z), \qquad \dot{E}'_z(x,y,z) = + \dot{E}_z(x,y, -z).$$

and a symmetrical standing wave will be established. Measurements
of the field distribution of a polyharmonic standing wave are
difficult in practice, and therefore the resonance method is more
convenient. The problem then is to determine the conditions under
which the field in a resonant model of the system is identical

Card 4/ 10

A method of measurement of the ....

30741
S/535/60/000/125/002/008
E133/E162

with the field of a standing wave in a periodically loaded wave-guide. It is shown that the field in a resonator formed by a length of a polyharmonic slow-wave structure short-circuited at both ends by metallic walls will be identical to the field of a symmetrical standing wave in this system only when: 1) the sections of the slow-wave structure possess a cross-sectional plane of mirror symmetry;   2) the short-circuiting end walls are situated in the plane of symmetry and at a distance apart of $L = NT$, where N is a whole number and T is the period of the system;   3) the length of the resonator amounts to a whole number of semi-waves of the slow wave, i.e. $\lambda_z/2 = L/m$. If the resonant model of a slow-wave structure satisfies the above conditions, then, when it is excited by a variable frequency, resonances will be found which correspond to those frequencies at which a whole number of slow semi-waves occur, i.e:

$$\frac{\lambda_z}{2} = \frac{L}{m} \quad \text{or} \quad \frac{\lambda_z}{2} = \frac{N}{m} T \tag{19}$$

and the retardation corresponding to these resonant frequencies

Card 5/10

30741

A method of measurement of the S/535/60/000/125/002/008
E133/E162

will be given by:

$$\gamma = \frac{c}{f_p \lambda_z} = \frac{cm}{2f_p L} = \frac{cm}{2f_p NT} \qquad (20)$$

Resonances relating to the investigated forms of the wave can always be distinguished from the other possible resonances by measurement of the field distribution in the cross-sectional plane. In practice, it is sufficient to find the distribution of the normal components of the electric field E_z at the end walls along the x and y axes. Thus, a number of discrete points on the dispersion curve may be determined. These values, relative to T for various values of N and m, are tabulated. The physical significance of the table is discussed. The value of m may be found by counting the resonances as they occur. To calculate the coupling impedance of the harmonics, it is necessary to find the amplitude A_n. If the distribution of the longitudinal component of the electric field of the symmetrical standing wave $E_{z\ ct}(z)$ has been found experimentally, then for the resonant model:

Card 6/10

30741

A method of measurement of the ...   S/535/60/000/125/002/008
                                        E133/E162

$$\dot{A}_n = \frac{1}{L} \int_0^L E_{z\ ct}\ (z)\ \cos \frac{\pi}{L}\ (m + 2nN)\ z\ dz \qquad (28)$$

This formula enables the amplitude $\dot{A}_n$ of the harmonic of a
travelling polyharmonic wave to be obtained by measurement of the
field distribution of a symmetrical standing wave in a resonant
model of the system. To calculate the coupling impedance of the
harmonics from measurements on a resonant model, the concept of
maximum coupling impedance is introduced. This is given by:

$$R_{max} = \frac{E_{z\ max}^2}{2k_z^2\ P} \qquad (30)$$

where $E_{z\ max}$ is the maximum value of the real amplitude of the
longitudinal electric field (for fixed values of the cross-
sectional coordinates for the point of observation). Hence, the
coupling impedance of the harmonic is expressed by:

Card 7/10

A method of measurement of the ....

30741
S/535/60/000/125/002/008
E133/E162

$$R_n = \left(\frac{A_n}{E_{z\,max}} \frac{k_z}{k_{nz}} \right)^2 R_{max} \tag{31}$$

and finally:

$$R_n = \varepsilon_n^2 \frac{m^2}{(m + 2nN)^2} R_{max}; \tag{34}$$

$$\varepsilon_n = \int_0^1 \varepsilon(z') \cos \pi (m + 2nN) z'\, dz' \tag{35}$$

Thus, to determine the coupling impedance of a polyharmonic wave it is necessary to measure the maximum coupling impedance R_{max} of the resonant model, the distribution of the longitudinal component of the electric field $\varepsilon(z')$ along the length of the model, and the number of semi-waves of the basic harmonic between the end walls. The numbers N and n are determined previously. The maximum coupling impedance of the model is found by an absorption method. The normalized distribution function $\varepsilon(z)$ is

Card 8/10

30741

A method of measurement of the ...   S/535/60/000/125/002/008
E133/E162

given by:

$$\varepsilon^2(z) = \frac{E^2(z)}{E^2_{max}} = \frac{\Delta f(z) - \Delta f}{(\Delta f)_{max} - \Delta f} = \frac{\frac{\Delta f(z)}{\Delta f} - 1}{\frac{(\Delta f)_{max}}{\Delta f} - 1} \quad (39)$$

where $\Delta f(z)$ is the width of the resonance curve for each position of the element and $(\Delta f)_{max}$ is the width with the absorbing element at the point where the electric field has its absolute maximum. The requirements which must be met by the absorbing element are enumerated as follows: 1) It must have good longitudinal resolving power. 2) It must be sharply anisotropic. 3) Its dimensions must be such that there is insignificant change of the measured field within their limits. Finally, the advantages of the resonance method are listed. a) The various forms of the waves are easily separated. b) The difficulties of matching a section of the waveguide to a load over a wide band are avoided. c) The retardation can be determined very accurately

Card 9/10

30741

A method of measurement of the ...   S/535/60/000/125/002/008
E133/E162

by frequency measurements.   d) To determine the coupling impedance
only the distribution E_z along the length of the model is
required.
There are 2 figures and 1 table.

Card 10/10

30743

9,4230 (1532)

S/535/60/000/125/004/008
E133/E162

AUTHORS: Voskresenskiy, D.I., Granovskaya, R.A.,
             Deryugin, L.N., and Fedorov, S.I.

TITLE: Investigation of a slow-wave system with non-
             contacting fins

SOURCE: Moscow. Aviatsionnyy institut. Trudy. no. 125, 1960.
             Elektromagnitnyye zamedlyayushchiye sistemy; metodika
             izmereniya elektricheskikh kharakteristik. 43-66.

TEXT: The efficiency of a travelling wave tube incorporating
a slow-wave structure can be increased by introducing auxiliary
constant accelerating fields in the interaction space and thus
preventing over-grouping. A slow-wave system suitable for this
purpose is the θ-system, as shown in Fig.1. The metallic fins do
not make contact with the waveguide walls and are positioned by
dielectric supports. The electron beam passes through the middle
channel. In this article, the θ-system is investigated
experimentally. Initially, general considerations are discussed.
The experimental measurement of the retardation and of the
coupling impedance of the fundamental synphase wave is described
Card 1/6

30743

Investigation of a slow-wave system ... S/535/60/000/125/004/008
E133/E162

and the results on seven models produced. The effects of varying
the various dimensions are demonstrated. The field distribution
and the effects of connecting the fins to the walls of the wave-
guide are investigated. Finally, the higher modes which are
possible in the system are considered and investigated experimen-
tally. The longitudinal components of the electric field of the
fundamental synphase wave are shown in Fig.1. Theoretical
determination of the retardation factor and of the coupling
impedance is difficult, due to the complex geometry which is
specified by five independent dimensions: a, b, g_E, g_H, d,
and also by the period of the structure T and the fin thickness
t.   The effects of g_E and g_H can be estimated by the
relationships developed by L.N. Deryugin and N.V. Trunova (Ref.2:
Radiotekhnika, 1959, No.3) and the effect of increasing d is to
increase the retardation and to decrease the coupling impedance.
T affects these parameters only when it is near to $\lambda_z/2$ in
value. For experimental investigation, seven θ-system models were
prepared. The models were approximately square in cross-section
($b/a = 0.925$) and the dimensions of all the models are tabulated
(see Table 1). The dispersion characteristics of the θ-system -
Card 2/ 🌑

30743

Investigation of a slow-wave system... S/535/60/000/125/004/008
                                          E133/E162

the retardation factor and the coupling impedance - were obtained
by the resonance method, using the models. The construction of
the models, the experimental set-up and procedure are detailed.
The error in measurement of the retardation factor is estimated at
not more than 5% and that for the coupling impedance not more than
20%. The three experimental dispersion curves for models 2 ,
which differ only in their d dimension, are compared with the
theoretical curve for a three-channel system with the same g_E, g_H
and b, but without side walls (a = ∞), and show that increasing
d moves the curve towards the low-frequency side. The experimen-
tal dispersion curves for the first four models (which have
constant g_H and d dimensions, but different g_E dimensions)
show that reduction of g_E leads to a small displacement of the
curves towards the high-frequency side, but has little effect on
the slope. The experimental dispersion curves for models 2 and 5
(which have constant g_E and d dimensions, but different g_H)
show that increase of g_H moves the dispersion curve towards the
high-frequency side. The relative frequency bandwidth, correspon-
ding to a change in the retardation factor from 4 to 7, was

Card 3/0

307l3

Investigation of a slow-wave system...   S/535/60/000/125/004/008
E133/E162

10-15% for all the models.   Curves of the coupling impedance (at
the axis of the θ-system) versus the electrical depth of the
channels with: (a) g_H constant, g_E varied, and (b) g_E
constant, g_H varied) are produced.   Investigation of the field
distribution showed the presence of two symmetrically disposed
nodal lines of the electric field in the channel between the gaps
g_E and g_H.   The positions of these lines were investigated.
Systems with different values of T were compared, and the
results show that, except when T lies between $1/4\lambda_z$ and $1/2\lambda_z$,
its value has little effect on the characteristics of the system.
The effect of connecting the fins to the waveguide walls was
investigated.   It was established experimentally that the presence
of four metallic connections placed symmetrically at the nodes of
the electric field did not change the field distribution of the
fundamental synphase wave.   Their effect on the dispersion curves
was also investigated.   Finally, the retarded and accelerated
waves and fields, corresponding to E_{110}, E_{210}, E_{120} and E_{220}
modes in rectangular resonators were investigated.   The electric
field distributions obtained experimentally are shown
diagrammatically, and the results discussed.
Card 4/8

Investigation of a slow-wave system ... 30743
S/535/60/000/125/004/008
E133/E162

M.S. Neyman is mentioned in the article. There are 22 figures,
1 table and 3 Soviet-bloc references.

Table 1

Model number	$g_H \mid b$	$g_E \mid b$	$g_H \mid h$	$g_E \mid h$	d/a
1	0.011	0.054	0.025	0.12	0.01
2a	0.011	0.027	0.023	0.058	0
2b	0.011	0.027	0.023	0.058	0.01
2c	0.011	0.027	0.023	0.058	0.03
3	0.011	0.018	0.023	0.038	0.01
4	0.011	0.009	0.023	0.019	0.01
5	0.032	0.027	0.074	0.061	0.03

Card 5/6

S/535/60/000/125/005/008
E025/E335

9, 2590

AUTHORS: Voskresenskiy, D.I., Granovskaya, R.A. and
Deryugin, L.N.

TITLE: Investigation of delay systems of the interdigital
type

SOURCE: Moscow. Aviatsionnyy institut. Trudy. no. 125. 1960.
Elektromagnitnyye zamedlyayushchiye sistemy; metodika
izmereniya elektricheskikh kharakteristik. 67 - 91

TEXT: An experimental study was made of interdigital delay
structures, using the resonance-model method. The dispersion
curves were obtained by determining the resonant frequencies of
models of short-circuited lengths of the structure. The
distribution of the fields and the coupling impedances of the
harmonics were measured on the same models by the absorption
(perturbation) method. The experimental model contained six
periods of the structure enabling measurements to be made at
seven points in the first passband and at six points in the next
passband. These readings suffice for the construction of curves
of delay and coupling impedance versus frequency. The use of six

Card 1/3

S/535/60/000/125/005/008
Investigation of delay systems... E025/E335

periods gives sufficient sensitivity for the absorption method.
Two models of the delay structure each with a Q of 2000 but
differing in their relative dimensions were used. The electrical
height of the system is given in a table for both models in the
first and second passbands. Dispersion curves are given for both
models showing the delay of the phase velocity of the fundamental,
first positive and first negative harmonic. Curves given for the
delay of higher harmonics and for the delay of the group velocity
as a function of the wavelength in free space were calculated
from these results. The distribution of the longitudinal field
was measured by driving the model by a capacitative projection
at one end-wall, the detector head at the other end-wall having
the same capacitative coupling. The absorbing element was moved
along the axis of the model by a system of rollers and thread.
The absorbing element is described; its anisotropy had the
values $\mu_z/\mu_y = 20$, $\mu_z/\mu_x = 15$ (μ is the absorption coefficient
in the given direction). A diagram shows the idealized
distribution of the longitudinal field; the possible field
distributions for various amplitudes of the first three

Card 2/3

Investigation of delay systems ...   S/535/60/000/125/005/008
E025/E335

(m = 0, 1, -1) harmonics are examined and used to find the
sign of the field-distribution. The experimental results are
presented in a series of curves showing the maxima of the coupling
impedance; the variation of the field strength as the absorbing
element is moved along the resonator; the field distributions;
the relative amplitudes and coupling impedances of the fundamental,
first-positive and first-negative harmonics.
There are 25 figures, 2 tables and 6 references: 1 Soviet-
bloc and 5 non-Soviet-bloc. The English-language references
mentioned are: Ref. 2 - R.C. Fletcher - PIRE, v. 40, August,
1952, pp. 951-954; Ref. 3 - J.F. Hull, G. Novick and
B.D. Kumpfer - Proc. National Electronic Conference, v. 8,
Sept. 29, 30 and October 1, 1952, pp. 313-320, Chicago, Ill;
Ref. 5 - P. Palluel and A.K. Goldberg - The O-type Carcinotron
Tube, PIRE, March 1956, pp. 333-345.

Card 3/3

9.3700

77558
SOV/108-15-2-3/12

AUTHOR: Deryugin, L. K.

TITLE: Reflexion of a Plane Transversely Polarized
               Wave From a Rectangular Comb

PERIODICAL: Radiotekhnika, 1960, Vol 15, Nr 2, pp 15-26 (USSR)

ABSTRACT: The paper is an analytical study of reflexion of a
               plane wave from an infinite comb, the latter
               being an ideal conductor. The incidence plane of
               the wave is perpendicular to the comb peaks as
               shown on Fig. 1. Since proportional changes in the
               wavelength λ and in the comb dimensions do not
               influence the analysis, the following dimensionless
               magnitudes are introduced: (1) the relative

               period of the comb pattern $k = 2l \, / \, \lambda$; (2) the
               relative groove width $a = a/l$; and (3) the
               electrical groove depth $\theta = 2\pi h/\lambda$. It
               is possible to write $2l = 2\pi$, then

Card 1/9 $k = 2\pi/\lambda$ represents also the propagation

Reflexion of a Plane Transversely Polarized   77058
Wave From a Rectangular Comb   SOV/108-15-2-3/12
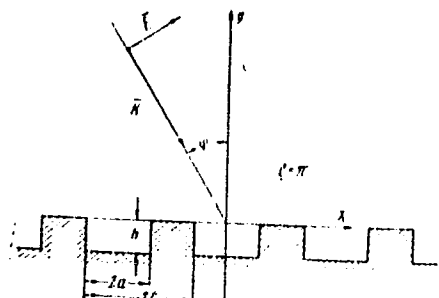

Fig. 1.

Card 2/9

Reflexion of a Plane Transversely Polarized   77958
Wave From a Rectangular Comb   SOV/108-15-2-3/12

constant. A case of transverse polarization is
considered, when i.e., vector $\vec{H}$ is perpendicular
to the comb peaks and the components $H_z = H$,

E_x and E_y are not zero. According to the first
Maxwell equation these field components may be
expressed as functions of H:

$$E_x = i \frac{\rho}{\kappa} \frac{\partial H}{\partial y}; \quad E_y = -i \frac{\rho}{\kappa} \frac{\partial H}{\partial x}. \tag{1}$$

where ρ is the wave impedance of the medium.
The expression for the incident plane wave is
defined as H exp i (γ kx + δ ky), where
H is the complex amplitude at the origin of co-
ordinates, $\gamma = \sin \varphi$, $\delta = \cos \varphi$, φ
being the incidence angle. Using the Fourier
Series, it is shown that in the space above the
comb (y > 0) the diffracted field H_g may be

Card 3/9   written as: (see equation 4)

Reflexion of a Plane Transversely Polarized
Wave From a Rectangular Comb

77568
SOV/108-15-2-3/12

$$H_x \cdot \sum_{n=-\infty}^{\infty} H_n \exp[ik(\gamma_n x + \delta_n y)].$$
(4)

where H_n are amplitude constants; γ_n and δ_n
are defined as

$$\delta_n = \pm \sqrt{1 - \gamma_n^2},$$
$$\gamma_n = \gamma + n\lambda^* \ (n = 0, \pm 1, \pm 2 \dots).$$
(3)

Here $\lambda^* = 1/k = \lambda/2z$. It may be seen from
Eq. (4) that terms with $\gamma_n^2 < 1$ represent
homogeneous plane waves which are reflected from
the comb under various angles φ_n defined as:

$$\sin \varphi_n = \gamma_n = \sin \varphi + n\lambda^*.$$
(5)

The terms with $\gamma_n^2 > 1$ represent nonhomogeneous
waves of which the field configuration is shown on

Card 4/9

Reflexion of a Plane Transversely Polarized   77953
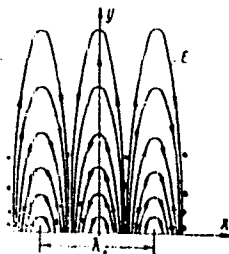Wave From a Rectangular Comb   SOV/108-15-2-3/12

Fig. 2.

Fig. 2.

Here, $\lambda_x = \lambda / \gamma$.   The nonhomogeneous waves
are attenuated as the distance from the comb
increases. At a sufficiently great distance the
diffracted field consists of homogeneous waves
only. The constants H_n in Eq. (4) are the complex
amplitudes of homogeneous or nonhomogeneous waves
at the origin of coordinates. The field $H \sum$ in

Card 5/9   the space above the comb may be represented as the

Reflexion of a Plane Transversely Polarized
Wave From a Rectangular Comb

77558

SOV/108-15-2-3/22

sum of the incident wave and the diffracted field.

$$H_z = H \exp i(\gamma \kappa x + \delta \kappa y) + \sum_{n=-\infty}^{\infty} H_n \exp i \kappa (\gamma_n x + \delta_n y).$$ (6)

An expression is given also for the magnetic field
H^* in the center groove($|x| < a$). Using
Eq. (1), expressions are obtained for the hori-
zontal components of the electrical field E above
the comb and of the electrical field E^* in the
grooves. A magnetic system of equations is deter-
mined, which expresses analytically that each wave
in the space above the comb excites all waves in the
grooves, and, vice versa, each wave in the grooves
excites all waves in the space above the comb. An
equivalent electric system of equations is also
given. Methods for computation of amplitudes of
harmonics in the space above the comb and in the
grooves are derived from the above system of
equations. The nonattenuated harmonics in the

Card 6/9

Reflexion of a Plane Transversely Polarized
Wave From a Rectangular Comb

grooves ($1 \leqslant 2k \, \alpha = 4a/\lambda$) may produce quarter-
wave depth resonances. These resonance phenomena
increase the entrance impedance of the grooves and
may lead to some extreme values of the reflection
coefficients. This is shown on Figs. 5, 6, 7, and 8,
where the reflection coefficients $R = \left|H_o/H\right|$
and $R_1 = \left|H_1\right| \; / \; \left|H\right|$ for normal incidence
are plotted as functions of Θ for $\alpha = 0.25$,
$\alpha = 0.5$ and various values of $k = 2l / \lambda$.
Near $\Theta^o = 90^o$ and $\Theta^o = 270^o$ the coefficients
of mirror reflection show minima values, whereas
coefficients of side reflection show the corre-
sponding maxima. The extreme values of the
coefficients are caused by the quarter-wave depth
resonance of the basic harmonic in the grooves.
At $\Theta^o = 180^o$ there is only a mirror reflexion.
The minima of the mirror reflection coefficient
depend on the selection of α and k, and may
be very low. When $\alpha = 0.5$

Card 7/9

Reflexion of a Plane Transversely Polarized   775.5
Wave From a Rectangular Comb   SOV/108-15-2-5/12

SUBMITTED:

and k = 1.5, for example, R_o = 0.05. For com-
parison, the dotted curve on the above figures is
plotted using an approximation method based on
the Huygens principle. The curve has a correct
shape but may lead to considerable quantitative
errors. There are 8 figures; and 12 references, 11
Soviet, 1 U.K. The U.K. reference is: Lord Rayleigh,
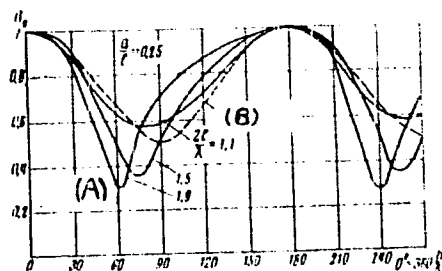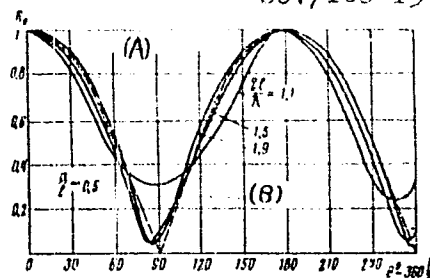Scientific Papers, Vol 5, art. 322, Cambridge, 1912.
July 19, 1958

Card 8/9

Reflexion of a Plane Transversely Polarized   77958
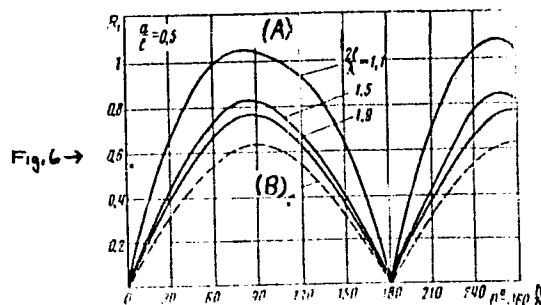Wave From a Rectangular Comb   SOV/108-15-2-3/12
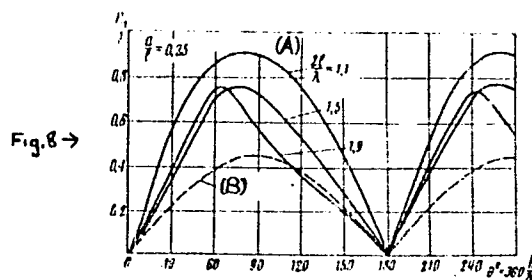

←Fig. 5

←Fig. 7

Fig.6→

Fig.8→

Card 9/9   (A) Transverse polarization, (B) According to Huygens

S/108/60/015/05/02/008
B007/B014

AUTHOR: Deryugin, L. N.

TITLE: Reflection From a Rectangular "Comb" Along a Longitudinally Polarized Wave

PERIODICAL: Radiotekhnika, 1960, Vol. 15, No. 5, pp. 9-16

TEXT: The author studied the reflection of a plane wave from an ideally conducting infinite "comb" by means of Fig. 1. $\vec{E}$ of the incident wave is parallel to the "comb". The succession of the solution of the diffraction problem for the determination of the reflection coefficient of longitudinal polarization is the same as in the paper of Ref. 1 in the case of transverse polarization in which a method is used, which is based on the "building-up" (sshivaniye) of the field above the "comb" over the field in the grooves. Equations are derived for the calculation of the reflection coefficient on the basis of an exact posing of the electrodynamic boundary problem. Figs. 3-6 show the curves of the reflection coefficients

$R_0 = \dfrac{|E_0|}{|E|}$ and $R_1 = \dfrac{|E_1|}{|E|}$ of the longitudinally polarized, perpendicularly

Card 1/2

Reflection From a Rectangular "Comb" Along   S/108/60/015/05/02/008
a Longitudinally Polarized Wave   B007/B014

inciding (φ = 0) wave as dependent on the electric groove depth with a
groove width of α = 0.25 and 0.5 and a comb period of k = 1, 1.5, and 2.
The curves were calculated from formulas (7) and (14) and compared with
those obtained by the electrodynamic method of "building-up" of fields,
and the characteristics of diffraction are given for both cases. A compari-
son between the reflections from the right-angled "comb" in the case of
longitudinal and transverse polarization of the perpendicularly inciding
wave shows that the divergence between the reflection coefficients of trans-
verse and longitudinal polarization increases with decreasing width of
the grooves. This divergence is ascribed to the different types of the
lowest harmonic in the grooves. The data obtained show that longitudinal
polarization warrants a more complete suppression of the reflected beam
than does transverse polarization. Lord Rayleigh's method (Refs. 2 and 3)
was found to be inaccurate due to the inexact recording of the field in
the grooves. There are 6 figures and 5 references: 3 Soviet and 2 English.

SUBMITTED: July 19, 1958

Card 2/2

$\sqrt{A}$

L 11038-65   EWT(1)/EEC-4/EEC(t)/EEC(b)-2/FCS(k)   P1-4/Pj-4/P1-4/Pac-4/Pae-2
RAEM(a)/ASD(a)-5/BSD/ASD(d)/AFETR/AFTC(b)/ESD(c)/ESD(gs)   WR

ACCESSION NR: AT4046226   S/2535/64/000/159/0005/0017

AUTHOR: Deryugin, L. N., Professor,(Doctor of technical sciences) Kuznetsov, M. G.,
(Candidate of technical sciences)

TITLE: Problems in the general theory of frequency-scanning antennas

SOURCE: Moscow. Aviatsionnyy institut. Trudy*, no. 159, 1964. Skaniruyushchiye
antenny* sverkhvy* sokikh chastot (Super-high frequency scanning antennas), 5-17

TOPIC TAGS: antenna theory, frequency scanning, superhigh frequency

ABSTRACT: The method considered in this article for the rapid scanning of antenna
radiation patterns is based on changes in the generator frequency. In this method, in
order to avoid electrical retuning of the generator frequency in a broad band exceeding
10%, the feeding apparatus (transmission lines, down-leads, etc.) associated with the
antennas must possess an angular-frequency sensitivity which is high in comparison with
conventional waveguide equipment: on the order of 5-10 degrees of radiation pattern
rotation per 1% change in frequency, and in some cases even higher. High-dispersion
modes, which ensure high angular-frequency sensitivity, are accompanied by high thermal
losses, resulting in severe attenuation along the system and limiting the directivity of the
arrays. In the present article, therefore, some results of an analysis of frequency-

Card 1/3

L 11038-65
ACCESSION NR: AT4040226   0

scanning-antennas are presented, and the basic principles underlying the calculation of
antenna systems of this type are discussed. Radiation angles are considered and the
equation for angular-frequency sensitivity is derived on the basis of a diagram illustrating
a periodic antenna delay system. An expression for the group delay of the wave is
obtained, and formulae for maximum permissible power are derived and analyzed.
With respect to this point, the authors demonstrate that there is a fundamental relation
between maximum power and the angular-frequency sensitivity of the antenna. Thermal
losses in the delay system are studied and several significant conclusions regarding these
losses in frequency-scan antenna delay systems are drawn. Among the latter are the
following: 1. Since both the attenuation and the angular-frequency sensitivity are pro-
portional to the group delay, any increase in the angular-frequency sensitivity is always ac-
companied by a rise in losses. 2. There exists no optimum from the point of view of
losses in the ratio between phase delay and dispersion, since the angular-frequency
sensitivity and the losses depend not on the phase lag and frequency dispersion, taken
separately, but on their algebraic sum, which forms the group delay of the beam. 3.
In order to reduce loses for a given angular-frequency sensitivity, it is sufficient to pro-
vide a high Q-factor rating for the delay system. 4. The Q of the delay system coincides

Card 2/3

L 11038-65
ACCESSION NR: AT4046226   /

with the Q of its individual cells or resonators. For a given conductivity in the metal
walls, an increase in the Q-factor requires large-size cells which possess the greatest
possible ratio of working volume to lateral surface. The possibilities of enlarging the
cells in periodic antenna systems are discussed and certain limitations are noted. The
final section of the article deals with the formulas and expressions involved in calculations
of the transmittance sectors of periodic systems. It is shown that the delay systems of
periodic frequency-scanning antennas have a number of specific properties which affect
the radiation. All such systems possess filtering properties and, on the basis of this
attribute, they may be classified as lower- and upper-frequency filters and band filters.
Angular sectors of transmittance correspond to the frequency passbands of these systems.
The width and orientation of these sectors are functions of the system type, the special
features of the radiating elements and the number of system cells between the radiators.
These factors are discussed in some detail in the concluding paragraphs of the paper. Orig.
art. has: 5 figures and 24 formulas.

ASSOCIATION: Moskovskiy aviatsionny*y Institut (Moscow Aviation Institute)

SUBMITTED: 00   ENCL: 00   SUB CODE: EC

NO REF SOV: 003   OTHER: 000

Card 3/3

L 11044-65   EWT(1)/EEC-4/EEC(t)/EEC(b)-2/TCS(k)   M-4/PJ-4/PL-4/Pac-4/Pae-2
BSD/ASD(a)-5/AFETR/ASD(d)/RAEM(a)/AFTC(b)/ESD(c)/ESD(gs)   WR
ACCESSION NR: AT4046232   S/3535/64/000/159/0124/0158

AUTHOR: Deryugin, L. N., Dr. of technical sciences, Professor, D. B. Zimin, Engineer

TITLE: Switch-type scanning antennas

SOURCE: Moscow. Aviatsionnyy institut. Trudy*, no. 159, 1964. Skaniruyushchiye anterny* sverkhvy*sokikh chastot (Super-high frequency scanning antennas), 124-158

TOPIC TAGS: antenna theory, frequency scanning, superhigh frequency, switching antenna, beam positioning

ABSTRACT: The switching method (otherwise called the "commutation method") of beam control is applicable to linear and surface antenna arrays which consist of a large number of individual radiating elements and form, in the aggregate, the antenna beam. For beam control in antennas of this type, one normally employs a system of tandem phase-inverters, connected to the feeder system which drives the radiators. The authors note that in electrical scanning systems the required phase shift of each individual phase-inverter (ferrite, for example) is determined by the control current, the amplitude of which must be set with consideration for the individual current-phase characteristics of each-phase-inverter. Attention is called to the fact that, in the practical implementation of such systems, serious difficulties are encountered because of instability (especially temperature

Card   1/5

L 11044-65
ACCESSION NR: AT4046232

instability) and non-identity of phase-inverter characteristics, high losses, and instability and non-identity of reflections from the inverters. All these factors are also present in systems of discrete control, when a number of separate working points are used on the phase-inverter response curves. The switching method described in this article reduces the difficulties in the formation of narrow scanning beams. The principle of "commutation scanning" is described, and it is pointed out that this method of scanning consists in the elimination of tandem phase-inverters, with beam control reduced to a series of extremely simple operations involving the switching on and off of the radiators or of specific branches of the feeder system (that is, the transmission line unit). A system of commutators or switches is employed in place of the phase-inverters. For forming and controlling the beam on an antenna section $\lambda/2$ in length, the authors note that a definite set of radiator phases is required; it is by means of the selective connection or "cutting in" of these latter elements that the beam may be positioned in the required direction, with scanning achieved by varying the alternation of the commutators or switches in the "on" and "off" position. The stability of these systems derives from the fact that the controlled elements of the radiators operate in the switching mode, with only the two extreme regions of their response curves employed. The following fundamental types of commutation antennas, differing in the manner in which the phase set is formed in the aperture, are discussed:

Card   2/5

L 11044-65
ACCESSION NR: AT4046232

1) an array consisting of several close parallel bars of the switched radiators; 2) an array of radiators driven from a single waveguide through switchable phase-shifters; 3) an array of switchable radiators arranged on a single waveguide at a short distance from one another. The authors describe the switching sequence of the commutators during the scanning process for each of these basic antenna types. From the explanations given in the paper it follows that the distinguishing features of switchable antennas are: 1. A disruption of the linearity of the phase distribution, leading, in a general case, to radiation pattern distortions, a proliferation of lobes and a reduction of antenna efficiency; 2. Jumping of the beam during scanning. It is noted that the character of the phase error distribution and, consequently, the radiation pattern of the antenna depend on the method by which the set of phases is formed, because of which the properties of antennas of various types differ somewhat, even if their phase sets are equal, and require individual examination. Moreover, the phase error distribution is generally non-periodic, and the radiation pattern of a switch-type antenna can be precisely determined only by numerical computations. For this reason, the authors outline methods for a preliminary estimation of the reduction in antenna efficiency during commutation scanning, as a function of the phase error, with any method of phase-set formation. An estimation of directivity pattern distortions at small and large angles of beam deviation is also given. Methods are proposed for reducing the phase error and the levels of spurious radiation. The sector of single-beam scanning is determined, additional pertinent parameters are discussed and expres-

Card   3/5

L 11044-65
ACCESSION NR: AT4046233

sions are obtained for their determination. Requirements are cited for the pitch of the radiating elements and the phase lag of the exciting wave, as well as for the operational speed of the commutators or switches used. The results of precise pattern calculations, as performed on an "Ural" computer using formulae obtained in the paper, are presented and interpreted. An analysis is made of the phenomenon of beam "jumping" during scanning. The following are the general conclusions reached by the authors: 1. In commutation scanning, phase errors arise which are determined by the set of phases of the radiating elements and which, in a general case, lead to a reduction of antenna directivity, the appearance of spurious beams and an increase in the reactive power of near-wave fields. 2. In a switchable antenna a single-beam radiation and scanning mode is possible, in which the spurious beams, caused by the phase errors, are removed "beyond the horizon" and affect only the reactive field of the antenna, while the directivity and pattern remain almost unchanged from those of an ideal antenna. To achieve this mode, the phase error period must be small; that is, the phase errors must change rapidly along the antenna. This condition leads to the requirement of small radiator pitch and a large delay or lag in the phase velocity in the driving waveguide. 3. In commutation scanning, the beam is displaced with small jumps, the magnitude of which is less than the beam width and decreases as the number of radiating elements increases. Orig. art. has: 16 figures and 57 formulae.

Card 4/5

L 21044-65
ACCESSION NR: AT4046232

ASSOCIATION: Moskovskiy aviatsionnyy institut (Moscow Aviation Institute)

SUBMITTED: 00   ENCL: 00   SUB CODE: EC

NO REF SOV: 005   OTHER: 000

Card 5/5

L 13260-65   EWT(1)/EEC-4/EEC(t)/EEC(b)-2/FCS(k)   Pac-4/Pae-2/P1-4/Pj-4/P1-4
BSD/AFTC(b)/AFETR/ASD(d)/ASD(a)-5/FAEM(a)/ESD(e)/ESD(gs)/ESD(t)   WR
ACCESSION NR: AT4046240   S/2535/64/000/159/0273/0282

AUTHOR: Deryugin, L. N. (Doctor of technical sciences, Professor)

TITLE: The efficiency with which scanning antenna arrays may be "sectionalized"

SOURCE: Moscow. Aviatsionnyy Institut. Trudy, no. 159, 1964. Skaniruyushchiye
antenny sverkhvysokikh chastot (Super-high frequency scanning antennas), 273-282

TOPIC TAGS: antenna theory, frequency scanning, superhigh frequency, antenna
array, phase shifter

ABSTRACT: The author considers the different techniques employed in the electrical
and electromechanical scanning of the beam of antenna arrays over a wide range
of angles. The controlled phase shifters which are almost always used in systems
of this type inevitably impair the basic characteristics of the antenna (efficien-
cy, noise temperature, gain, resolution, side lobe level), this being particularly
true in the case of electrically controlled shifters (ferrite, semiconductor or
plasma). Attention is also called to the complexity of the control system, which
necessarily increases as the dimensions of the antenna grow larger, as another
factor limiting the capabilities of scanning antenna systems. It is pointed out
that one of the methods which may be used to improve the characteristics of
Card 1/3

L 13260-65
ACCESSION NR: AT4046240

scanning arrays is their "sectionalization"; that is, the division of the array
into a series of identical scanning sections, phase-coupled by means of a supple-
mentary system of phase shifters. It is emphasized that "sectionalization" is not
to be regarded as a universal method capable of improving all the characteristics
of the antenna, but rather as a compromise measure, permitting the improvement of
some at the expense of others. For example, this may increase the efficiency of
the antenna at the expense of complicating its control system, and vice versa.
Nonetheless, by means of "sectionalization", a considerable effect can be achieved
with regard to increasing the dimensions of scanning antennas. In this article,
certain possibilities inherent in the "sectionalizing" technique with respect to
increased size are considered for linear scanning antenna arrays. Sectionalization
for an assigned maximum number of series-connected phase shifters and for an
assigned maximum number of control signals is discussed for one- and two-layer
arrays, and a binary arrangement is proposed. The problem of the optimal arrange-
ment with both of the above-mentioned parameters assigned (that is, number of
shifters and number of control signals) is analyzed, and a table is given indicat-
ing the number of radiators in optimal arrangements as a function of both of these
factors. The article concludes with a discussion of certain considerations which,
in the view of the author, should guide the choice of the "sectionalization" scheme
adopted. Orig. art. has 2 tables, 3 figures and 15 formulas.

Card 2/3

L 13260-65
ACCESSION NR: AT4046240

ASSOCIATION: Moskovskiy aviatsionnyy institut (Moscow Aviation Institute)

SUBMITTED: 00   ENCL: 00   SUB CODE: EC

NO REF SOV: 006   OTHER: 002

Card 3/3

ACCESSION NR: AP4026146   S/0108/64/019/003/0025/0033

AUTHOR: Deryugin, L. N. (Active member); Zimin, D. B. (Active member)

TITLE: Switching method of steering array beams

SOURCE: Radiotekhnika, v. 19, no. 3, 1964, 25-33

TOPIC TAGS: radio, radio antenna, beam antenna, beam antenna steering, antenna array, beam antenna switching steering, pencil beam antenna

ABSTRACT: A set of phase shifters is conventionally used for steering the beam of a multielement antenna array. Temperature instability and diversity of the characteristics of (ferrite) phase shifters have been serious drawbacks in operating this type of antenna. L. N. Deryugin's switching method (Author's Certificate no. 662448 of 11Apr60) is claimed to alleviate the difficulties of shaping a pencil-type steerable beam. In this method, a set of switches ("semi-conductors, ferrites, etc.") controls, on an on-and-off basis, the currents in the

Card 1/2

ACCESSION NR: AP4026146

individual radiators or feeder-system branches. Within a half-wave section of the array, a set of fixed radiator phases is provided, and the required direction of the beam is achieved through selective switching. By changing the sequence of the on-off positions, scanning can be effected. These types of linear switched antennas are considered: (1) an array formed by a few parallel rows of switched radiators; (2) an array of radiators excited from one waveguide via switching phase shifters, and (3) an array of switched radiators closely placed along one waveguide. A reduction of the antenna directivity, radiation-pattern distortion, and spurious-beam levels inherent to the new method are theoretically evaluated. Orig. art. has: 7 figures, 8 formulas, and 1 table.

ASSOCIATION: Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi (Scientific and Technical Society of Radio Engineering and Electrocommunication)

SUBMITTED: 30Dec62   DATE ACQ: 16Apr64   ENCL: 00

SUB CODE: EC   NO REF SOV: 002   OTHER: 000

Card 2/2

L 57841-65   EWT(l.)/EEC-4/FCS(k)/EWA(m)-2   P1-4/Pj-4/P1-4   WR

ACCESSION NR: AP5015254

UR/0286/65/000/009/0036/0036
621.396.67

AUTHOR: Ayzenberg, A. L.; Deryugin, L. N.; Kuznetsov, M. G.;
Adrab'yevskiy, A. I.; Bakhrakh, I. D.

TITLE: Two-mirror antenna with automatic phase error compensation.
Class 21, No. 170556

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 9, 1965, 36

TOPIC TAGS: two mirror antenna, phase error compensation

ABSTRACT: To reduce phase errors in the aperture of the proposed two-
mirror antenna and increase the possibility of increasing antenna gain,
the small mirror is divided into automatically adjustable sections; the
automatic phasing system has a hf-field phase feedback circuit through
the space between the mirrors. A block diagram of the antenna is shown
in Fig. 1 of the Enclosure. Orig. art. has: 1 figure.   [DW]

ASSOCIATION: none

Card 1/3

L 57841-65

ACCESSION NR: AP5015254

SUBMITTED: 23Apr54   ENCL: 01   SUB CODE: EC

NO REF SOV: 000   OTHER: 000   ATD PRESS: 4036

Card 2/3